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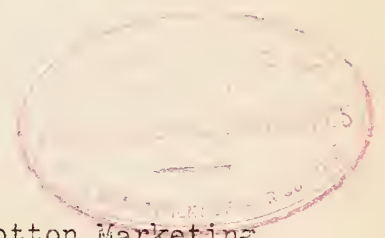
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A BRIEF EXPLANATION OF SOME CAUSES OF VARIATION
IN THE CLASSIFICATION OF COTTON

Prepared by Ronald E. Betts, Associate Agricultural Economist



For the use of employees of the Division of Cotton Marketing,
Agricultural Marketing Service.

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In classing cotton individual judgment, or the human element, is perhaps as large a factor as is the case in the grading of any other major agricultural product. This condition is the result of the nature of the product and the fact that the quality factors are determined by judgment rather than measurement. In the grading of any product where the interpretation and application of the standards depends largely on the personal judgment, aptitude, and training of the individual doing the grading at least some variations resulting from differences of opinion are bound to occur. This condition is recognized in the trade and in the government service as evidenced by the establishment of arbitration boards and appeal boards to review or arbitrate these differences of opinion.

In grading cotton, the leaf and foreign matter are not removed and are not therefore measured and expressed in terms of percentage or weight. The grade factors of color, character and preparation are not expressed in terms of physical measurements by the classer. The fibers that make up the sample are not all of the same length, and the length of individual fibers is not measured. Thus none of the quality elements are determined by precise measurement as is done in grading some other products.

In the process of grading cotton, the classer picks up the sample and opens it in several places to ascertain (1) the amount and distribution of leaf and other foreign matter, (2) the color, and (3) preparation of the sample. Frequently classers "face up" the sample at a typical "break" and hold the sample alongside the grade box that they think it most nearly matches, to ascertain to what extent the three grade factors, leaf, color, and preparation of the sample, are in agreement with the grade standards.

In classing cotton for grade, the classer is required to consider carefully the three quality factors: leaf, color, and preparation. He must ascertain the size and amount of leaf and foreign matter in the sample and thus decide the grade standard that the sample most nearly matches from the standpoint of foreign matter. He must also decide which physical or descriptive grade standard the sample most nearly resembles in color, as well as whether the sample should be designated as Extra White, White, Spotted, Tinged, Yellow Stained, or Gray. He must decide whether or not the "preparation" of the sample is comparable with that of the standard against which he has graded the sample.

It is quite obvious that the sample may not exactly match a single grade standard in all of these grade factors. Thus it is frequently necessary that the classer offset a little excess leaf, for example, against a somewhat brighter color, or a slightly duller color against smoother preparation. In balancing the three factors (leaf, color, and preparation) the classer has no physical measurements of any kind upon which to base his decisions. However, there are certain regulations for the guidance of classers in grading samples in which the grade factors vary from those of any one grade standard. In any borderline case the classer should always hold the sample beside the standards box as a

guide in forming a judgment as to which of the grade standards the sample most nearly resembles in each of the three factors. In case the parts of the sample taken from the two sides of the bale are not alike, the grade designation to be given is that of the lower side.

Conditions under which the samples are graded, particularly with respect to light, play a very important part in influencing the classer's judgment. The size and density of the sample and the training, experience, and physical condition of the classer are all factors of more or less importance.

Studies of classification for grade have shown that in ordinary classing work and under average conditions an experienced and well trained classer with a reasonable degree of aptitude for this type of work can duplicate his own classification on about 85 percent to 90 percent of the samples. Thus it is evident that, in general, a surprisingly high degree of proficiency in classing has been attained when consideration is given to the many possible combinations of leaf, color, and preparation and also to the fact that a classer has no way of actually measuring any of these factors but must depend upon his own judgment to interpret them in terms of the standards.

In classing cotton for length of staple, the classer makes what is called a "pull." In other words, the classer selects a tuft of fibers from the sample and by a process of lapping, pulling, and discarding, parallels a typical portion of the fibers. He then arrives at the length to be assigned the sample by judging the length of the "pull" with the eye. Only on special occasions do classers measure the length of the pull by the use of a ruler. More often, however, a classer compares his pull of a sample with his pull of the staple type with which the classer thinks the sample most nearly compares. Thus, the classer's judgment is again brought into use but is substantiated by comparison and thus approaches rather closely to a physical measurement.

If a sample of cotton that a classer has designated as one inch in staple length is sorted into groups according to the length of the individual fibers, it will be found that some of the fibers are longer than one inch, that a considerable number are shorter than one inch, and that some fibers are even as short as $1/8$ of an inch. It will probably be found that only a small proportion of the fibers is actually just one inch in length by measurement. However, a considerable proportion of the fibers may be close to one inch in length. It is the classer's job to make a pull of the sample and to decide what length should be assigned the typical portion of the fibers obtained in the pull. It is evident that two classers might not get exactly the same distribution of fibers in the tufts which they use in making the "pull." Therefore, it would be easily possible for two classers to designate the sample as being different in length by $1/32$ or even $1/16$ inch and for both classers to be correct according to the tuft each pulled from the same sample.

In classing for length, classers are frequently required to reduce the designation of a sample from the actual length of the typical portion of the fiber because of the weak, immature, irregular, or wasty condition of the fibers. Again the classer's judgment is brought into the classing of the sample. If the two parts of the sample taken from the two sides of the bale are not the same in length, the classer should designate the length as that of the shorter side.

The amount of moisture in a sample affects the apparent length. If one classification is made when the sample is rather damp, it is quite possible, after the sample has dried out, for another classer to designate the same sample as $1/32$ inch or even $1/16$ inch shorter than did the first classer. Studies have indicated that in the ordinary run of classing an experienced and well-trained classer with an aptitude for stapling and classing in thirty-seconds of an inch can duplicate his own class for length of staple on about 70 to 75 percent of the samples; and if a tolerance of $1/32$ inch is allowed, on about 96 to 98 percent of the samples.

It should be pointed out here that a great deal of experience and training is required to develop proficiency in classing, and it must be realized that all classers are not equally proficient. When one considers, however, the extent to which human judgment enters into classing, the number of factors to be evaluated, the lack of any means of exact measurement, the influence of differences in moisture, light, and other classing conditions, the experience and training of the classer, and the possible variation within the sample itself, it is quite evident that some variation in classing is inevitable.

Every possible effort is being made by the Department of Agriculture to coordinate the classing of cotton and to reduce variations to a minimum. The consistent use of the official standards, studies of classing results, and close supervision of all classing are being particularly stressed.

